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DIPLOID DRYOPTERIS DILATATA FROM QUEBEC

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In eastern North America, ferns allied to *Dryopteris dilatata* (Hoffm.) A. Gray include *D. spinulosa* (O. F. Muell.) Watt ($4\times$), *D. intermedia* (Muhl.) A. Gray ($2\times$), *D. dilatata* (Hoffm.) A. Gray ($2\times$) from the Lake Superior basin, and *D. campyloptera* Clarkson ($4\times$) from the Appalachians. The last two are referable to *D. spinulosa* var. *americana* (Fisch.) Fernald of Gray's Manual (Fernald, 1950). The distribution of *D. campyloptera* has been considered to be from high elevations in the mountains of North Carolina and Virginia in the south, north to Maine, Nova Scotia, the Gaspé Peninsula, Newfoundland, Labrador, Ungava (Fort Chimo) (Dutilly, Lepage and Duman, 1953), south along the east coast of Hudson's Bay and James Bay (Dutilly, Lepage and Duman, 1958; Dutilly and Lepage, 1963) to Mt. Sherrick (Potter, 1934), and Lake Kelvin (Dutilly and Lepage, 1963). Also, there have been a few collections in interior Quebec (Dutilly and Lepage, 1964). Cytological determinations of chromosome number have been made by Wagner (1963) from material collected at Mountain Lake, Virginia; Walker (personal communication) from material collected in Rutland Co., Vermont and Quebec Co., Quebec; Britton (1962) from Mt. Washington, N. H. and Britton (unpublished) from Yarmouth, Nova Scotia. These have all been tetraploid.

Diploid specimens are now well known from the Lake

Superior basin. I have studied cytologically nearly 100 plants from the Pigeon River on the Minnesota border of Ontario to Batchawana River which is approximately 50 miles north of Sault Ste. Marie, Ontario. The diploid taxon in Ontario was mapped by Soper (Britton and Soper, 1966). Wagner and Hagenah (1962) refer to this taxon as "Lake Superior '*D. dilatata*'" and suggest that it may be a distinct species, whereas I consider it to be conspecific with *D. dilatata* of British Columbia (Britton, 1962), which in turn is probably conspecific with the diploid *D. dilatata* of Great Britain, called *D. assimilis* S. Walker (Walker, 1961; Walker and Jermy, 1964).

The discovery in the Clay Belt of Quebec, near Amos, of a member of this alliance was reported by Morton in Baldwin *et al.* (1962). These were named by Morton, *D. dilatata* ssp. *campyloptera* (Baldwin, 1962; Morton, 1965). Through the kindness of Father André Asselin of Amos College, I was sent in 1965 two plants from Lac Beaudoin near Amos. These were both diploids, *not* tetraploid as one might expect from the published ranges given above. To study more plants of this taxon and to search for the tetraploid taxon, Dr. Hugh Dale and the author visited Amos in June. Under the able guidance of Father Asselin, we collected specimens from Lac Beaudoin, Lac Beauchamp and Lac Legendre. Twelve specimens of *D. dilatata* were studied cytologically and were diploid ($n=41$). No tetraploids were found, and no hybrids of *D. dilatata* were discovered, although *D. spinulosa*, *D. intermedia* and *D. × triploidea* were also abundant in the area.

Wagner and Hagenah (1962) have published a key to separate the diploid taxon from the tetraploid, but it is quite unsatisfactory for my material. According to them, the diploid has an average exposure length of 33-37 microns, whereas the range for averages of different tetraploids is 37-40 microns. Ten collections of the diploid from Lake Superior studied by this author had average values from 36-41 (average of lengths of 20 exospores in Permunt) whereas the tetraploids from New Hampshire and Nova Scotia varied from 37-41. There was a cluster of values

for different diploids around 37 and 38 microns, and one specimen was as high as 41.4. One tetraploid was as low as 37.4. Wagner (1963) reported a tetraploid which was as low as 35.9. Accordingly, it is impossible to separate the diploid from the tetraploid by average spore lengths alone.

The other characteristics in the key have also failed to separate the diploids from the tetraploids. Out of the first 30 collections of the diploid laid out at random on a laboratory bench, 17 were *not* "ovate and very broad", but matched the shape of some of the tetraploids. Nine did not have a petiole to midrib ratio approaching one to one ("average 95%, range 75-115%" Wagner and Hagenah, 1962). Sixteen did not have approximate to overlapping segments, and the petiole scales were variable in most. I know of no simple way to distinguish between the two taxa other than by chromosome number.

It will require further cytological work to determine the ploidy of the Quebec, Labrador, Gaspé and Newfoundland plants which have been referred to as *D. spinulosa* var. *americana* (Fisch.) Fernald. However, it is clear that the diploid which is allied to *D. dilatata* and which is so abundant along the north shore of Lake Superior, extends nearly 300 miles to the east. This is less than 100 miles south of Lake Kelvin, and is approximately 300 miles W. N. W. of Quebec Co., Quebec where the nearest tetraploid was collected. It may well be, that it is the diploid which extends up the coast of James Bay to the tree line at Fort Chimo in Ungava. If this is the case, the tetraploid may be the less common of the two taxa in Quebec. A further possibility is the occurrence of a region in Quebec where the diploid and tetraploid occur together.

The specimens collected by Morton (Baldwin *et. al.*, 1962; Morton, 1965) in the Clay Belt and ascribed to sub-species *campyloptera* (Clarkson) Morton should be identified as *Dryopteris dilatata*.

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